

1(amended). A cobalt-chromium dental alloy comprising by weight percent:

about 60 to about 85% cobalt;

about 15 to about 30% chromium;

greater than 2% and up to about 20% manganese; and

about 1 to about 15% aluminum, indium, gallium, tin, or germanium, or mixture thereof; and

wherein the coefficient of thermal expansion at room temperature to about 500 °C is about 16 to about $18 \times 10^{-6}/^{\circ}\text{C}$.

9(amended). A cobalt-chromium dental alloy comprising by weight percent:

about 65 to about 80% cobalt;

about 18 to about 25% chromium;

about 2 to about 10% manganese;

about 2 to about 10%, iron, nickel, palladium, or platinum, or mixture thereof;

about 1 to about 7% aluminum, indium, gallium, tin, or germanium, or mixture thereof;

about 1 to about 5% gold; and

about 0.1 to about 3% iridium, ruthenium, rhenium, titanium, silicon, or copper, or mixture thereof; and

wherein the coefficient of thermal expansion at room temperature to about 500 °C is about 16 to about $18 \times 10^{-6}/^{\circ}\text{C}$.

Cancel claims 4 and 11.

REMARKS

Claims 1 and 9 have been amended and claims 4 and 11 have been cancelled. No new matter has been added. Support for the addition to claim 1 is found in Table 3 on page 5. All of the coefficients of thermal expansion for the compositions from Table 2 are about $16 \times 10^{-6}/^{\circ}\text{C}$. In view of the foregoing amendments and following remarks, reconsideration of the application is respectfully requested.

Claims 1 – 15 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In response thereto, claims 1 and 9 have been amended to include the phrase “weight percent.” The claims now appear in proper format.

Claims 1 – 8 were rejected under 35 U.S.C. 103(a) as being unpatentable over Prasad (U.S. Patent No. 4,530,664). It is the Examiner’s opinion that the high-end content of manganese taught in Prasad ‘664 is substantially the same as the claimed invention’s low-end range of “greater than 2%.” The Examiner concludes that applicant must show some unexpected advantage for the alloy having a minor amount of manganese in excess of 2% compared to exactly 2% to show patentability of the claims.

Moreover, claims 9 – 15 were rejected under 35 U.S.C. 103(a) as being unpatentable over Prasad ‘664 in view of Chiaramonte (U.S. Patent No. 4,108,642). The Examiner applies Prasad ‘664 as discussed above. The Examiner cites Chiaramonte ‘642 to show that 1 – 40 wt% gold may be added to a cobalt-chromium containing dental alloy to give the alloy a gold color, lower melting point and improved mechanical properties. For the reasons set forth below, the rejections are respectfully traversed.

The claims have been amended to include the coefficient of thermal expansion. Claim 1 is now directed to a cobalt-chromium dental alloy comprising by weight percent about 60 to about 85% cobalt, about 15 to about 30% chromium, greater than 2% and up to about 20% manganese, and about 1 to about 15% aluminum, indium, gallium, tin, or germanium, or a mixture thereof. Prasad ‘664 requires 2 wt% or less of manganese in the composition. The coefficient of thermal expansion is about $16 - 18 \times 10^{-6}/^{\circ}\text{C}$ as shown in Table 3. The coefficient of thermal expansion in the compositions in Prasad ‘664 are in the range of $13 - 15 \times 10^{-6}/^{\circ}\text{C}$, which is much lower and makes a big difference when matching the coefficient of the alloy to the coefficient of the porcelain veneer. The claims herein are directed to alloys for use with high-expansion porcelains. The claims are not rendered obvious over the cited reference.

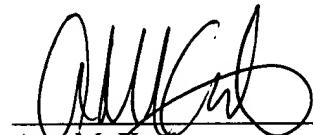
With respect to claims 9 – 15, Prasad ‘664 does not render obvious the claimed invention. Chiaramonte ‘642 does not cure the deficiencies of Prasad ‘664. Chiaramonte ‘642 is unlike the claimed invention and is unlike the alloy in Prasad ‘664. The small

amount of gold added to the instant invention, 1 to 5 wt %, does not change the color of the white alloy to a gold color. Chiaramonte '642 is not concerned with a specific coefficient of thermal expansion. The coefficient of thermal expansion of the alloy of the claimed invention is much greater than that taught by Prasad '664. There is no showing or suggestion in Chiaramonte '642 to add or alter components in the composition therein in order to affect or alter the coefficient of expansion. It would not have been obvious to alter the composition of Prasad '664 in view of the teaching of Chiaramonte '642 to arrive at the thermal expansion claimed in the instant application. The claimed invention is not rendered obvious by the cited references.

In summary, none of the references, alone or in combination, teach applicant's invention directed to a cobalt-chromium dental alloy comprising about 60 to about 85% cobalt, about 15 to about 30% chromium, greater than 2% and up to about 20% manganese, and about 1 to about 15% aluminum, indium, gallium, tin, or germanium, or a mixture thereof and having a coefficient of thermal expansion of about $16 - 18 \times 10^{-6}/^{\circ}\text{C}$. None of the references teach applicant's invention directed to about 65 to about 80% cobalt, about 18 to about 25% chromium, about 2 to about 10% manganese, about 2 to about 10% iron, nickel, palladium, or platinum, or mixture thereof, about 1 to about 7% aluminum, indium, gallium, tin, or germanium, or mixture thereof, about 1 to about 5% gold, and about 0.1 to about 3% iridium, ruthenium, rhenium, titanium, silicon, or copper, or mixture thereof, and having a coefficient of thermal expansion of about $16 - 18 \times 10^{-6}/^{\circ}\text{C}$. None of the references show or suggest applicant's claimed invention and notice to this effect is respectfully requested.

Accordingly, it is believed that claims 1 - 3, 5 - 10, and 12 - 15 specify patentable subject matter and are now in condition for allowance. Applicant therefore respectfully requests favorable reconsideration and allowance of this application. The Examiner is requested to telephone Applicant's attorney at the number listed below if it will advance the prosecution of this case. If necessary, the Examiner is authorized to charge further fees necessary to advance the prosecution in this case from Deposit Account No. 500718.

Respectfully submitted,



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Attorney Docket: JPP-1260ANP

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the claims:

Claims 1 and 9 were amended as follows:

1(amended). A cobalt-chromium dental alloy comprising by weight percent:
about 60 to about 85% cobalt;
about 15 to about 30% chromium;
greater than 2% and up to about 20% manganese; and
about 1 to about 15% aluminum, indium, gallium, tin, or germanium, or mixture
thereof; and

wherein the coefficient of thermal expansion at room temperature to about 500 °C
is about 16 to about 18 x 10⁻⁶/°C.

9(amended). A cobalt-chromium dental alloy comprising by weight percent:
about 65 to about 80% cobalt;
about 18 to about 25% chromium;
about 2 to about 10% manganese;
about 2 to about 10%, iron, nickel, palladium, or platinum, or mixture thereof;
about 1 to about 7% aluminum, indium, gallium, tin, or germanium, or mixture
thereof;
about 1 to about 5% gold; and

about 0.1 to about 3% iridium, ruthenium, rhenium, titanium, silicon, or copper,
or mixture thereof; and

wherein the coefficient of thermal expansion at room temperature to about 500 °C
is about 16 to about 18 x 10⁻⁶/°C.

Claims 4 and 11 were cancelled.